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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,620	03/13/2001	Craig M. Carpenter	MI22-1563	3004

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EXAMINER

STOUFFER, KELLY M

ART UNIT PAPER NUMBER

1762

DATE MAILED: 10/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/805,620

**Applicant(s)**

CARPENTER ET AL.

**Examiner**

Kelly Stouffer

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 9/25/06.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 22-35,38,40,43 and 45-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-35,38,40,43 and 45-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/25/06</u> | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. The examiner acknowledges the cancellation of claims 36, 37, 39, 41, 42 and 44 in the reply dated 25 September 2006.

### ***Drawings***

2. The drawings were received on 27 September 2006. These drawings are acceptable.

### ***Response to Arguments***

3. Applicant's arguments filed 25 September 2006 with regard to the 35 USC 103(a) rejections of Okase in view of Sneh et al. for claims 22-26 and the 35 USC 103(a) rejections of claims 22-47 of DiMeo, Jr. et al. in view of Ohashi et al. and Yamauka et al. have been fully considered but they are not persuasive.

The Applicant argues the 35 USC 103(a) rejections of claims 22-26 because the Applicant believes that Okase in view of Sneh et al. does not provide for a solid barrier wall with the features required by claim 22. The Applicant further argues that side wall 71 in Figure 7 of Okase does not represent the solid barrier wall as claimed because of an opening 71a shown in Figures 8A and 8B. The Examiner maintains that side wall 71 in Figure 7 does represent the solid barrier wall as claimed, because even with opening 71a a solid side wall 71 is seen to extend below the substrate, and it is attached to one wall of the chamber to separate the purge material from the substrate holder as

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described by Okase in columns 15 and 16 et seq. (Also see column 3 lines 1-10)

Therefore, the rejections of the previous office action with regard to claims 22-26 are maintained and are repeated in this office action.

The Applicant further argues that there is not sufficient motivation to combine Dimeo with the teachings of Ohashi with regard to claims 22-47 because the art does not recognize that some of the material in DiMeo undergoes chemisorption with the reactor walls. This is not found convincing. Regardless of if the materials undergo chemisorption or physisorption, the process of DiMeo would benefit from removal of material from the walls of the reactor. Accumulation of materials on the reactor walls is a very common problem with ALD processes. This is evidenced by Bondestam et al. (US 2002/0157611 A1). One of ordinary skill in the art would recognize that the purge gas taught by Ohashi would prevent material from accumulating on the walls of the reactor. Even if the process of DiMeo does not explicitly teach that material accumulates on the walls, inherently there is some probability of it happening. One of skill would not expect the wall to be perfectly immune from accumulation, especially in view of the dead spaces that may occur in DiMeo. The purge curtain reduces this probability, as taught by Ohashi.

The present invention essentially is claiming to use a purge gas to eliminate gas from the chamber where it may exist. If gas accumulates in a certain area (i.e. along the walls), to use the purge gas in those areas would have been obvious. As shown above, accumulation along the walls is not a foreign concept.

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In addition, the Applicant argues that the type of particles generated by the claimed methods are not the same as those generated by Ohashi and therefore one would not modify an ALD method with Ohashi. However, there is not a particular type of particle claimed by the applicant in the current claims, therefore this argument is not convincing. The rejections of the previous office action are maintained with regard to claims 22-47, and are repeated in their entirety.

4. Applicant's arguments with regard to the 35 USC 103(a) rejection of claims 27-47 of Okase in view of Sneh et al. filed 25 September 2006, have been fully considered and are persuasive in view of the newly amended claims. The 35 USC 103(a) rejection of Okase in view of Sneh et al. of claims 27-47 has been withdrawn.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okase (US 5,884,009) in view of Sneh (US 6,305,314).

Okase teaches a heated substrate treatment system where an annular, concentric purge curtain is fed into the chamber, around the periphery of the substrate

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and along the chamber walls, while the process gas is being injected over the substrate (column 10, lines 10-55). The curtain extends downward from above the substrate holder (figure 3). Figures 3 and 7 show the purge curtain flowing past the substrate holder and the flow diverter (51b) extending to below the substrate. In the same figures, the purge gas is not directed towards the substrate and back flow is minimized. The aspects of the lid are read on in the figures. The process prevents particles from adhering and either contaminating or corroding the walls of the chamber (column 2, lines 40-50). As the purge enters through an inlet port (77) and then exits this section through an exit port (76) into the chamber. All other limitations are taught in the various embodiments corresponding to figures 3 and 7. The reference teaches that the processing method may be CVD, but is silent to performing ALD in the process.

However, Sneh teaches that ALD is a type of CVD that is also susceptible to contaminants adhering to the walls of the chamber. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to perform an ALD process in the system taught by Okase. By doing so, one would have a reasonable expectation of success, as Okase teaches that the system is applicable to any vaporous treatment process that is susceptible to contaminants adhering to the chamber walls and Sneh teaches that ALD is such a process.

6. Claims 22-35, 38, 40, 43 and 45-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiMeo, Jr. et al. (US 6,972,430) in view of Ohashi et al. (US 6,059,885), in further view of Yamamuka et al. (US 6,312,526).

DiMeo teaches an ALD process that uses purge to eliminate process gases from the chamber between steps (column 5, lines 1-25). The reference is silent to using a purge curtain.

However, Ohashi teaches an annular, concentric purge curtain being fed into the chamber, around the periphery of the substrate and along the chamber walls, while the process gas is being injected over the substrate (column 18, lines 28-67). The curtain extends downward from above the substrate holder (figures 7 and 8). Figure 7 shows the purge curtain flowing past the substrate holder. The solid walls that make up the hollow annular portions (21, 829) of figures 6 and 8 read on being a flow diverter (column 17, lines 10-19). These walls partially extend into the chamber from the top (first wall, lid) of the chamber. In figure 10, the direction of the apertures (1048) read on not directing the purge gas towards the substrate and minimizing back flow. The aspects of the lid are read on in the figures. The process prevents particles from adhering to the walls of the chamber by eliminating dead spaces by filling them with a purge curtain (column 2, lines 25-43). As the purge enters the section labeled "I" in figure 6, it goes through an inlet port and then exits this section through an exit port into the chamber.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a purge curtain, as taught by Ohashi, in the process taught by DiMeo. By doing so, particles are prevented from adhering to the walls of the chamber.

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The combination of references above fails to teach the flow diverter extending below the substrate holder. However, Yamamuka teaches such a configuration in figures 11 and 12. By doing so, the chances of particles adhering to the walls are even further reduced as the temperature distribution is made smaller and the process gas is not likely to flow against the flow of the purge gas (column 10, lines 10-58). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to extend the flow diverter to below the substrate. By doing so, one would reap the benefits of further reducing the chances of particles adhering to the walls of the chamber.

As to claim 27, Figures 1a-1d and figure 4 of Ohashi, teach the flow profiles that should be used when only one gas is being supplied to the chamber.

As to claim 38, Ohashi teaches that the purge curtain prevents adhering of particles to the wall. One of skill would recognize that it would also remove particles that are all ready adhered to the wall. To minimize the amount of purge gas would have been obvious at the time the invention was made to a person having ordinary skill in the art. By doing so, less purge gas is required. To determine the amount of purge gas in the curtain for the purge and deposition steps, if any at all, would have been within the skill of one practicing in the art, through routine experimentation.

All other limitations may be found in column 18, lines 28-67, and figures 7 and 8 of Ohashi.



***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

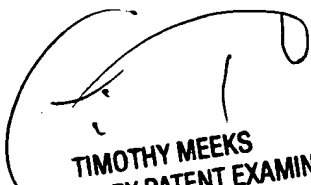
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer  
Examiner  
Art Unit 1762

kms



TIMOTHY MEEKS  
SUPERVISORY PATENT EXAMINER